

CALIFORNIA ENERGY COMMISSION

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September 29, 2006

Dear Stakeholder:

The California Energy Commission's Public Interest Energy Research Program (PIER) staff invites you to participate in a scoping workshop to develop an avian wind energy research Roadmap. This workshop will be held in Sacramento, at the California Energy Commission on November 2, 2006.

The workshop will identify research needed to increase certainty in methods and metrics used to assess and mitigate potential impacts to birds and bats from wind facility developments. This research program will compliment the Energy Commission's Systems Assessment and Facility Siting Division staff's process of developing Avian Wind Siting Guidelines.

The Energy Commission uses a Roadmapping process to establish the research agenda. The Roadmap will identify gaps in ongoing research as it relates to selected issues, facilitate collaboration, and define short, mid, and long-term goals. In addition, it presents an assessment of the budget and timeframes required to achieve goals established and articulated in the roadmap.

The primary objective for the workshop is to discuss a draft list (attached) of research topics and receive input from stakeholders. Using a facilitator, we plan to add to, modify, justify and prioritize the list. The product of the workshop is a prioritized list of research and accompanying rationale that represents the perspectives of a broad cross-section of stakeholders.

The Roadmap developed through this effort will likely guide research decision-making for the next several years. Your assistance over the next few months is critical to overall success of the ensuing research program. Our proposed timeline for this undertaking follows:

- September: Distribute a draft list of research needs to aid the scoping process
- November 2: Hold a Scoping Workshop in Sacramento to discuss, add, delete and prioritize needs
- January: Release a Draft Roadmap
- February: Hold a Workshop to discuss the Draft Roadmap
- March: Release the Final Roadmap

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Stakeholders are requested to provide comments on this list in writing by October 16, 2006 so we can incorporate comments into a revised list that will be presented and discussed at the workshop on November 2, 2006. We hope that you can participate in the workshop and welcome the opportunity for discussions about the research needs. If you have questions please contact Linda Spiegel at lspiegel@energy.state.ca.us or (916) 654-4703 or Melinda Dorin at mdorin@energy.state.ca.us or (916) 654-4024.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kelly Birkinshaw', with a stylized flourish at the end.

Kelly Birkinshaw
Program Manager, Environmental Area
Public Interest Energy Research

Draft List of Study Needs to Support Guidelines for Conducting Avian and Bat Assessments at Wind Facilities

September 2006

BACKGROUND

Wind energy development is a critical component towards diversifying California's energy supply, reaching the State's renewable energy resource targets, reducing dependence on fossil fuels and reducing production of green house gas emissions. Fatalities of birds and bats from collisions with wind turbines remain a complicated and inhibitive issue surrounding the development of new sites and operations at some existing sites. To date, much monitoring and some extensive studies have occurred to improve understanding of bird and bat collisions with wind turbines. However, few studies use similar methods and metrics and thus comparative or meta-analysis is difficult if not impossible.

In collaboration with the Department of Fish and Game, The California Energy Commission (Commission) is leading an effort to establish voluntary guidelines for addressing avian and bat issues at wind energy facilities in California. These guidelines are designed to in part create a common format for regulators charged with assessing and permitting these facilities. Ideally, these scientifically based guidelines add uniformity and greater certainty for all parties, including developers, regulators, conservation groups, and other stakeholders that all potential impacts have been identified and addressed.

In general, existing guidelines¹ are based on expert judgment. Without empirical data considerable uncertainty remains about: how to conduct these studies; what parameters to measure; and how to interpret resulting conclusions. The scopes of many impact studies are dictated by budget limitations and therefore produce results with larger statistical uncertainty. While an important consideration, it is in the interest of all parties to agree on data collection methods, analysis and uncertainty levels acceptable for siting these facilities

Because of the barrier avian issues represents to wind development and to achieving statewide renewable energy goals, the Commission is initiating a research program designed to provide an empirical foundation to wind energy facility siting guidelines. The specific tasks undertaken include a review of existing methods and metrics, assessing the uncertainties associated with these methods, and developing research that could inform future wind siting/permitting policy. The results of this investigation will be put forth in a research plan or roadmap, that: 1) defines the state-of -the-art; 2) identifies other institutions conducting related research; 3) establishes broad research goals and objectives, 4) identifies research needs and collaborative opportunities and 5) provides an assessment of the timeframe and budget necessary to achieve the goals described in the

¹ Guidelines have been or are being developed in other countries (Canada, Germany), states (Vermont, Washington, Texas) and by U.S federal agencies (USFWS, USBLM, USFS)

roadmap. Although final decision-making remains with the Commission, the intent is to collaborate with all stakeholders, ensure the full range of interests are captured, and ultimately produces a framework that produces a scientific foundation to siting guidelines used throughout California.

APPROACH

Commission staff are currently reviewing the literature, participating in national efforts (i.e. the National Wind Coordinating Committee), surveying experts, and actively following the discussions and comment letters from the Commission's Avian Wind Siting Guidelines workshops to compile a draft list of current research needs applicable to California. This list is intended as a starting point to stimulate discussion among stakeholders.

The list of research needs is organized into the broad categories of Pre-construction, Post Construction Monitoring, and Mitigation. For each category an overarching question is posed followed by several, more specific research questions or issues needed to answer that question. The list is fairly comprehensive but not all inclusive as it is not our goal to produce an exhaustive list of interesting research questions, but rather to identify priority research needs that are considered of utmost importance toward better understanding impacts and mitigation. We believe that one well-designed study conducted at several sites will be able to address several issues. Some issues will require studies designed specifically to address those issues. The success of accomplishing the final research agenda will rely on collaboration and leveraged funding by all stakeholders.

Stakeholders are requested to provide comments on this list in writing by October 16, 2006. Comments will be incorporated into a revised list that will be presented and discussed at a workshop on November 2, 2006. Staff will use the revised list and comments from the workshop to develop a draft research roadmap that will be released in January of 2007, followed by a second workshop to discuss the draft in February 2006. A final roadmap will be released in March.

RESEARCH NEEDS

Pre-construction

Impacts to birds and bats by wind facilities vary by location, as does the location of individual turbines within a facility. Once enough comparable data is generated and analyzed, it may be possible to develop a decision tree or phased approach to conducting adequate pre-construction analyses. Research is needed to gain a better understanding of how to predict possible impacts.

What are the appropriate search intervals and methodologies to gain adequate, comparable information on bird use of a site, bird behavior, and what the trade-offs are between cost, accuracy, and precision?

- What are the appropriate frequencies, durations, and radii of point counts/visual observation scans?
- How well does observation data on bird/bat use and behavior predict potential levels of mortality?
- Can information on bird use, bird abundance, species vulnerability, topography lead to map-based indicators of collision risk?
- Can a meta-analysis of comparable data from several projects lead to an indicator of high risk situations?
- Are the heights of bird migration routes generally higher than collision risk zones?
- Is radar an effective method for determining risk?
- Can surveys conducted at dawn and dusk alone predict risk?
- What are adequate time intervals to conduct surveys (ground and radar) to account for seasonal and annual variation of use?
- Can use data alone effectively micro-site turbines in low risk locations?
- What are the appropriate metrics to determine site use?
- How do site utilization metrics differ by the use of different technologies (radar, night vision, thermal imaging, and acoustic detections)?
- What combination of bat sensing techniques (radar, acoustic monitoring, thermal imaging, night vision devices) provides the most reliable data set on bat occurrence?
- What information on bat migration and habitat use would be useful for predicting mortality?
- What activity levels of bats in an area would be considered high risk?

Post-construction

Once a wind facility is operating, the most important information to obtain is the level of collision-related mortality occurring as a result of operation. This information can then be used to derive factors leading to fatalities and to improve pre-project assessments. Research is needed to improve upon existing methods and metrics used to determine levels of mortality.

What are the appropriate methods and metrics to accurately estimate levels of mortality due to wind turbine operations and how well did the pre-construction assessment predict impacts?

- What is the appropriate duration of monitoring to adequately account for annual variation in fatalities due annual variation in use? Can long-term periodic monitoring (e.g. every 3 years) capture that variation as well as yearly monitoring?
- What are the adequate search intervals and search radii for the various turbine heights to capture a high percentage of fatalities?
- What is the percentage of actual fatalities found necessary to provide confidence in estimating mortality?
- What is the level of baseline, non-turbine related mortality?

- Is the number of dead songbirds found an accurate indication of songbirds killed?
- How does the taxa, size and condition (i.e. frozen) of different species affect the outcome of scavenger removal trials?
- What is the appropriate duration and metric (some use percentage of carcass remaining after so many days and some use mean number of days until all carcasses are removed) to measure scavenger removal rates?
- Are the equations used to estimate scavenger removal appropriate?
- Can the use of dogs to find carcasses be efficient and cost effective?
- What is the most appropriate fatality metric (e.g. fatality/MW, fatality/actual MW output/bird utilization) to adequately compare sites?
- Are pre-construction surveys adequately predicting mortality?
- Do patterns of use change after construction of wind facilities?
- What is the level of bat mortality at all California wind facilities?
- What is the level of bird mortality at all California wind facilities?

Mitigation

If operating wind facilities are causing bird or bat fatalities, measures are needed to reduce those fatalities. Because wind turbine attributes, bird use, and landscape features that may contribute to fatalities vary greatly, it is often difficult to isolate reasons for collision and therefore correct problems. To date, however, few mitigation measures have been studied to determine their efficacy. Research is needed to help identify promising measures to reduce fatalities in wind facilities that have documented this to be a problem.

What information is necessary to develop appropriate mitigation measures and to understand the efficacy of those measures?

- What turbine designs are more likely to result in collision?
- Can micro-siting in low risk areas and removing turbines from high risk areas sufficiently reduce fatalities?
- Can blades be made more visible to birds or bats?
- Can seasonal shut downs prevent fatalities?
- Can habitat manipulations (rodent control, other prey reduction techniques) to reduce bird use near turbines reduce fatalities to acceptable levels while not causing impacts to other species?
- Is it feasible to design a study to determine population level effects of local fatalities (particularly for winter migrants)?
- Are there ways to deter bats from turbines?
- Is providing habitat off-site an effective measure to compensate for fatalities at wind facilities?